1. Expenses: The total annual expenses associated with the treatment works, as defined in Article II, Section 8, are estimated as follows:

BASED ON 2015 BUDGET NUMBERS **Item**	**Annual Budget Expense**		
Utilities - Personnel Accts	$ 49,395.00		
Utilities - Commun./Utilities	$ 14,500.00		
Utilities - Supplies/Misc.	$ 27,200.00		
Utilities - Maintenance/Services	$ 10,500.00		
Utilities - Capital Expenses	$ -		
Utilities - Loan/Lease Principal	$ 600.00		
Utilities - Loan/Lease Interest	$ 50,000.00		
Utilities - Misc. Exp.	$ -	*$ 152,195.00*	*Utilities Total*
Sewer - Personnel Accts	$ 211,400.00		
Sewer - Commun./Utilities	$ 33,900.00		
Sewer - Supplies/Misc.	$ 147,365.00	($59,365 + $25K pipe + $15K degreaser)	
Sewer - Maintenance/Services	$ 92,550.00	Includes $10K for truck equip.	
Sewer - Capital Expenses	$ 183,000.00	Includes sewer rehab ($150K)	
Sewer - Loan/Lease Principal	$ 9,400.00		
Sewer - Loan/Lease Interest	$ 84,950.00		
Sewer - Misc. Exp.	$ -		
Sewer - Transfers Out	$ -		
		$ 762,565.00	*Sewer Total*
WWTP - Personnel Accts	$ 185,700.00		
WWTP - Commun./Utilities	$ 125,400.00		
WWTP - Supplies/Misc.	$ 81,400.00	Includes supply add-ons per budget	
WWTP - Maintenance/Services	$ 33,000.00	Excludes $400K for new ditch	
WWTP - Capital Expenses	$ 6,550.00	PW Bldg.	
WWTP - Loan/Lease Principal	$ 400.00		
WWTP - Loan/Lease Interest	$ 157,000.00		
WWTP - Misc. Exp.	$ 50,000.00	Per Darin C., for WWTP-Engr'g.	
WWTP - Debt Service on UV System	$ 281,000.00		
WWTP - $100K/yr Escrow	$ 100,000.00		
WWTP - Capital Expenses Add-Ons	$ 145,000.00	*$ 1,165,450.00*	*WWTP Total*
2015 IMPROVEMENT PROJECTS ANNUITY		Included in WWTP-Capital Add-Ons above	
2016 IMPROVEMENT PROJECTS ANNUITY			
2017 IMPROVEMENT PROJECTS ANNUITY			
2018 IMPROVEMENT PROJECTS ANNUITY			
Other			
Total Sewer & WWTP Expenses, w Sewer portion of Utilities Dept.:	$ 2,080,210.00		
Revenues Received from Other Sources			
Dedicated Capital Improvement Sales Tax Revenue	$ -		
Other Revenue (specify)	$ -		
Other Revenue (specify)	$ -		
Other Revenue (specify)	$ -		
Other Revenue (specify)	$ -		
Total Revenues from Other Sources:	$ -		
Total Expenses to be Derived From User Charges:	$ 2,080,210.00		

2. Allocation of Expenses: The total operation and maintenance, including replacement expenses, is allocated to the appropriate pollutants in the following manner.

Annual Dollars to Treat Annual Flow = XX% annual cost allocated to flow x (total annual O&M budget minus billing, collection, administration, and debt less dedicated debt revenue)

= 100% X $ 2,080,210.00 - $ 929,945.00

= $ 1,150,265.00

Annual Dollars to Treat Annual BOD = XX% annual cost allocated to BOD x (total annual O&M budget minus billing, collection, administration, and debt less dedicated debt revenue)

= 0% X $ 2,080,210.00 - $ 929,945.00

= $ -

Annual Dollars to Treat Annual SS = XX% annual cost allocated to SS x (total annual O&M budget minus billing, collection, administration, and debt less dedicated debt revenue)

= 0% X $ 2,080,210.00 - $ 929,945.00

= $ -

Annual Dollars to Treat Annual Other = XX% annual cost allocated to Other Pollutant x (total annual O&M budget minus billing, collection, administration, and debt less dedicated debt revenue)

= 0% X $ 2,080,210.00 - $ 929,945.00

= $ -

100%

(Note: In this example, the billing, collection, administration, and debt expenses are deducted from the total O&M budget at this point because each user will pay the same for these expenses per billing period. See paragraph 5 for Minimum Charge calculation. In some situations other appropriate expenses may be handled in the same manner. Costs associated with debt can be collected as part of the unit/volume charge or as a combination of the Minimum Charge and Unit Charge. The ordinance writer should adjust the allocation of percentages to Flow, BOD, and SS to fit their specific type of treatment works.

3. Loadings

The number of system users is:	4,200	Customers
The initial hydraulic loading (less I/I) is estimated to be:	260,000,000	Gallons/year
The initial BOD loading is estimated to be:	652,000	Pounds/year
The initial SS loading is estimated to be:	770,000	Pounds/year
The initial *Other Pollutant (specify)* loading is estimated to be:	-	Pounds/year

(Note: If the loading estimates for BOD, SS, and Other Pollutant(s), are based on historical data from the Treatment Works and the concentration is different from the definition of Normal Domestic Wastewater, please see note in paragraph 6

before completing the Residential Unit Charge Calculation.)

Normal Domestic BOD based on above loadings:	***301***	***mg/l***
Normal Domestic SS based on above loadings:	***356***	***mg/l***
Normal Domestic Other Pollutant based on above loadings:	***-***	***mg/l***

4. Unit Costs:

Initial unit cost for flow in $/gallon =

Annual $ to treat annual flow / Estimated annual hydraulic loading - inflow & Infiltration

= $ 1,150,265.00 / 260,000,000

= $ 0.004425 per gallon

Initial unit cost for BOD in $/pound =

Annual $ to treat annual BOD / Estimated annual BOD loading

= $ - / 652,000

= $ - per pound

Initial unit cost for SS in $/pound =

Annual $ to treat annual SS / Estimated annual SS loading

= $ - / 770,000

= $ - per pound

Initial unit cost for *Other Pollutant(s)* in $ =

Annual $ to treat annual *Other Pollutant(s)* / Estimated annual *Other Pollutant(s)* loading

= $ - / -

= $ - per pound

(Note: The unit costs for BOD, SS, and Other Pollutants are to be inserted in Article IV, Section 4 of the ordinance.)

5. Minimum Charge:

Number of users:	4,200
Billing Period:	12

Billing and Collection	=	$ 50,797.50	Half of 'Utilities' minus debt
Administration	=	$ 50,797.50	Other half of 'Utilities' minus debt
Annual Debt Service	=	$ 828,350.00	All debt, capital exp. add-on, escrow
Total Annual Minimum Cost	=	$ 929,945.00	

Minimum Charge = Total Annual Minimum Cost/Billing Period/Number of Users

= $ 18.46

(Note: The Annual Debt Service collected through the minimum charge is the Total Annual Debt Service less any other revenues dedicated to debt retirement as indicated in the budget.)

(Note: The minimum charge, per user, per billing period is to be inserted in Article IV, Section 3 of the ordinance.)

6. Residential User Unit Charge:

The residential user unit charge is calculated as follows using the Normal Domestic pollutant concentrations as defined in Article II, Section 2 of this ordinance. **Note: If the estimated loadings in paragraph 3 result in pollutant concentrations that are different than those defined in Article II, Section 2 of this ordinance, then the definition must be revised or the contributors of extra strength wastewater must be identified (see paragraph 7).**

Residential Unit Charge = unit flow charge + [(unit BOD charge) x (BOD_{ND}) x (.00834)] + [(unit SS charge) x (SS_{ND}) x (.00834)]

Where:

Residential unit charge is in $/1,000 gallons;
Unit BOD charge is in $/pound of BOD from paragraph 4;
Unit SS charge is in $/pound of SS from paragraph 4;
BOD_{ND} is the Normal Domestic BOD strength in milligrams per liter (mg/l) as defined in Article II, Section 2, of the ordinance;
SS_{ND} is the Normal Domestic SS strength in milligrams per liter (mg/l) as defined in Article II, Section 2, of the ordinance; and,
.00834 is a unit conversion factor.

= $0.0044 x 1000 + [($0.0000 x (301 mg/l) x (0.00834)] + [($0.0000) x (356 mg/l) x (0.00834)]

= $ 4.43 per 1,000 gallons

(Note: The total residential unit charge is to be inserted in Article IV, Section 3, of the ordinance.)

An example calculation of a monthly residential charge is as follows:

Assumed flow = 5,000 gallons

$18.46 + [(5,000/1,000) x $4.43] = $40.61 per month

Missouri
Department of
Natural Resources

RATE ASSIST (Wastewater) Program

Welcome to the Missouri Department of Natural Resources' wastewater **Rate Assist** Program. The **Rate Assist** Program was developed as a tool to help wastewater system operators with the development of a proportional user rate structure. Throughout the different **Rate Assist** spreadsheets, users will see references to various "Article" and "Section" numbers. These references refer to the department's model User Charge Ordinance, which can be viewed and downloaded at www.dnr.mo.gov/env/wpp/srf/cw-user-charge-ordinance.doc

Rate Assist is designed to produce proportional rates based on actual usage. For entities participating in the Clean Water State Revolving Fund (CWSRF) loan program, or other grant and loan programs administered by the department, their User Charge methodology must contain rates that are proportional based on actual use. However, the use of **Rate Assist** is not required for participation in any grant or loan program administered by the department.

The **Rate Assist** program is an Excel based workbook consisting of four separate spreadsheets: (1) Instructions, (2) Budget & Rate Methodology, (3) Replacement Schedule, and (4) Annual Replacement Annuity. To complete the various spreadsheets, users will need to have the following information available: (1) wastewater system budget, (2) number of users, (3) billable water volume (or other estimate of system usage), (4) loading estimates for BOD and Suspended Solids (SS), and (5) list of system replacement items including current replacement cost. To avoid erasing or overwriting the formulas in **Rate Assist**, do not enter any data or information in the green highlighted cells. Prior to entering any data into the **Rate Assist** program, it is recommended that users save a secondary copy as a backup in case some of the formulas are inadvertently erased.

A. Budget & Rate Methodology Spreadsheet

On the **Budget & Rate Methodology** spreadsheet, users will enter the budgeted expenses associated with their wastewater system. In addition to the expenses, users will also enter information regarding other revenues that are used to fund their wastewater system. Examples of these other revenue sources include Dedicated Capital Improvement Sales Taxes, Ad Valorem Taxes, Sewer Connection Fees, Interest Income, Etc. When other revenue sources are being used to fund the wastewater system, users should rely on historical amounts for the various revenue sources. Also, very conservative estimates should be utilized for revenues from connection fees or other sources that can vary greatly from one year to the next. Over-estimating these revenues can have a detrimental impact on the financial stability of your wastewater system.

When entering expenses into the **Budget & Rate Methodology** spreadsheet, users should keep in mind that **Rate Assist** is set-up to automatically direct expenses from certain line items to the "Minimum Charge" calculation. This includes the following budget line items: **Billing and Collection**, **Administration**, and **Total Annual Debt Service**. Other than these three line items, all of the expenses from the other line items are used in the volumetric rate calculation. Users can adjust their budget entries to reflect the needs of their specific system. The expense amount for Replacement Costs will automatically fill-in once the **Replacement Schedule** and **Annual Replacement Annuity** spreadsheets are completed. Those spreadsheets are discussed in greater detail in Sections B and C of the Instructions.

Once the budget information has been entered, users will need to enter the allocation percentages for Flow, BOD and SS associated with their particular type of treatment system. For mechanical treatment facilities, the allocation percentages are typically 40-30-30 for Flow, BOD and SS. The percentage for Flow would be higher, with the percentages for BOD and SS being lower, for lagoon facilities. Keep in mind that the percentages must equal 100%.

In Section 3 (Loadings) of the **Budget & Rate Methodology** spreadsheet, enter data for the Number of System Users, Hydraulic Loading (less I&I), BOD Loading, and SS Loading. The figure entered for Hydraulic Loading must reflect the amount of billable water volume (or other estimate of usage) rather than the amount of flow at the treatment plant. Otherwise, the rates will not generate sufficient revenues. Once the data has been entered, Rate Assist will calculate the concentrations for Normal Domestic BOD and SS based on the loadings entered. The concentrations for BOD and SS should coincide with the Normal Domestic concentrations as defined in your User Charge ordinance. If not, either revise the loading estimates or amend the ordinance language so that the loading estimates and ordinance language don't conflict.

Based on the Expenses (Section 1), Allocation Percentages (Section 2) and the Loading (Section 3) information entered, **Rate Assist** will calculate the Unit Costs for Flow, BOD and SS in Section 4 of the spreadsheet. These Unit Costs will be used later in the **Budget & Rate Methodology** spreadsheet to calculate the Residential User Unit Charge (Volumetric rate). The Unit Costs will also be used for calculating the charges for users who discharge high-strength wastewater that exceeds the Normal Domestic concentrations for BOD and/or SS.

In Section 5 (Minimum Charge), enter the number of Billing Periods that corresponds to your particular billing system (for monthly billings enter 12, quarterly billings would be 4, etc.). Once the number of Billing Periods is entered, **Rate Assist** will calculate the Minimum Charge/User/Billing Period. As discussed above, **Rate Assist** is designed to automatically allocate the expenses entered in the Billing and Collection, Administration and Annual Debt Service line items to the Minimum Charge calculation. Some entities opt to include a set amount of usage in the Minimum Charge. If that is the case, the corresponding Residential User Unit Charge (from Section 6) will need to be added the Minimum Charge amount calculated in Section 5. Otherwise, users won't be charged for costs associated with the flow included in the Minimum Charge.

At this point, if the **Replacement Schedule** and **Annual Replacement Annuity** spreadsheets have been completed, no further data entry is needed. In Section 6 (Residential User Unit Charge), **Rate Assist** calculates a volumetric rate based on all of the data entered. The rate is shown as dollars per 1,000 gallons. If your wastewater system bills are based on a rate per 100 cubic feet, simply use the following conversion to convert gallons to cubic feet: Gallons divided by 7.48052 equals cubic feet (Example: 1,000/7.48052 = 133.681 cubic feet). At the end of Section 6, **Rate Assist** provides a sample user charge calculation for a 5,000 gallon/month user.

Section 7 (Extra Strength Users) provides a sample calculation for an extra strength user. The final calculation in Section 7 of the **Budget & Rate Methodology** spreadsheet is an adequacy check to verify that the rates derived will actually generate sufficient revenues. If this calculation indicates a deficit, please correct any erroneous data. Also, be sure that any sample data contained in the spreadsheets has been removed if it doesn't apply to your system.

B. Replacement Schedule Spreadsheet

To ensure that the wastewater system is properly maintained and that funds are available to cover those costs, a Replacement Schedule needs to be developed that addresses the major equipment components within the system. As discussed at the top of the **Replacement Schedule** spreadsheet, the schedule should list the major equipment components, their anticipated replacement date(s), and the estimated cost of replacement based on today's cost. The schedule should cover the useful or design life of the wastewater system. For loan participants, the schedule must cover the entire term of the loan, at a minimum. As the user rates are reviewed each year, it is strongly recommended that the Replacement Schedule be updated as well to keep it current.

When the **Replacement Schedule** spreadsheet is first opened, users will see a sample Replacement Schedule that can be used as a guide for developing a Replacement Schedule for your particular wastewater system. Due to the highly variable nature of replacement schedules, users will need to update and/or add formulas to the cells in the Yearly Total column. Otherwise, the totals in the Yearly Total column may not be accurate.

C. Annual Replacement Annuity Spreadsheet

Once the **Replacement Schedule** spreadsheet is complete and the yearly totals are verified, it is time to transfer that information to the **Annual Replacement Annuity** spreadsheet. The yearly totals from the Replacement Schedule will need to be manually entered in the Estimated Replacement Cost column for each year. Also, be sure to remove any sample data that doesn't pertain to your particular system. The estimated rates for Inflation and Interest need to be updated. Also, if your wastewater system already has a Replacement Account established, enter the current balance in the corresponding field.

Rate Assist will calculate the Annual Annuity amount that will be required for the estimated replacement costs. However, some years may show a deficit in the Net Fund Balance column. If that is the case, the Annual Annuity amount may need to be increased to eliminate those deficits. The Annual Annuity amount calculated on the **Annual Replacement Annuity** spreadsheet will be automatically inserted into the Replacement Costs line item in the budget.

D. Questions, Comments, Etc.

For questions relating to **Rate Assist**, the CWSRF loan program or other loan and grant programs administered by the department, please contact the Water Protection Program's Financial Assistance Center at (573) 751-

Appendix B to User Charge System

REPLACEMENT SCHEDULE

This appendix contains a replacement schedule that was developed to determine the amount of revenue needed to fund the Replacement Account. The replacement schedule lists the major equipment in the wastewater system, the estimated dates when the equipment will have to be replaced, and the estimated cost of replacement (based on today's cost) over the useful life of the wastewater system. The replacement dates and costs shown are estimates; the actual replacement dates and costs could be significantly different from those shown. If the actual replacement expenses differ significantly from those listed in the replacement schedule, the funding of the Replacement Account shall be adjusted accordingly. The Replacement Fund Calculation includes factors for inflation and interest. These should be adjusted to reflect actual interest and inflation rates.

Years From Treatment Works In Operation	Replacement Item	Cost Per Item	Yearly Total
1	Replace seals, chamber fluids, gaskets	$150.00	$150.00
2	One-year items	$150.00	$150.00
3	Chlorination rebuild	$250.00	
	Float replacements	$100.00	
	One-year items	$150.00	$500.00
4	One-year items	$150.00	$150.00
5	Aerator belts	$200.00	
	Clarifier gear box	$650.00	
	Pump wear rings and gear box seals	$900.00	
	One-year items	$150.00	$1,900.00
6	Three-year items	$500.00	$500.00
7	One-year items	$150.00	$150.00
8	Motor rebuild	$1,350.00	
	One-year items	$150.00	$1,500.00
9	Motor rebuild	$1,350.00	
	Three-year items	$500.00	$1,850.00
10	Impeller replacement	$300.00	
	Five-year items	$1,900.00	$2,200.00
11	Impeller replacement	$300.00	
	One-year items	$150.00	$450.00
12	Three-year items	$500.00	$500.00
13	Electrical replacements	$350.00	
	One-year items	$150.00	$500.00
14	Electrical replacements	$350.00	
	One-year items	$150.00	$500.00
15	Three-year items	$500.00	
	Five-year items	$1,750.00	$2,250.00
16	Eight-year items	$1,500.00	$1,500.00
17	Electrical replacements	$350.00	
	One-year items	$150.00	$500.00
18	Impeller replacement	$300.00	
	Nine-year items	$1,850.00	$2,150.00
19	Impeller replacement	$300.00	
	Motor rebuild	$1,350.00	
	One-year items	$150.00	$1,800.00
20	Ten-year items	$2,200.00	$2,200.00
		$21,400.00	$21,400.00

Appendix C to User Charge System

REPLACEMENT FUND ANNUAL ANNUITY

(A separate sheet showing what items are to be replaced, what year, and estimated replacement cost, should also be attached.)

Inflation	**2.00%**
Interest	**2.00%**
Initial Balance	**$0.00**

Year	Estimated Replacement Costs	X	2.00% Compound Amount Factor (F/P)	=	Future Worth	X	2.00% Present Worth Factor (P/F)	=	Adjusted Present Worth	Interest on Fund Balance	Net Fund Balance
	Initial Balance										*$0.00*
1	$150.00		1.020000		$153.00		0.980392		$150.00	0.00	$1,155.80
2	$150.00		1.040400		156.06		0.961169		$150.00	23.12	$2,331.66
3	$500.00		1.061208		530.60		0.942322		$500.00	46.63	$3,156.49
4	$150.00		1.082432		162.36		0.923845		$150.00	63.13	$4,366.06
5	$1,900.00		1.104081		2,097.75		0.905731		$1,900.00	87.32	$3,664.43
6	$500.00		1.126162		563.08		0.887971		$500.00	73.29	$4,483.44
7	$150.00		1.148686		172.30		0.870560		$150.00	89.67	$5,709.61
8	$1,500.00		1.171659		1,757.49		0.853490		$1,500.00	114.19	$5,375.11
9	$1,850.00		1.195093		2,210.92		0.836755		$1,850.00	107.50	$4,580.49
10	$2,200.00		1.218994		2,681.79		0.820348		$2,200.00	91.61	$3,299.11
11	$450.00		1.243374		559.52		0.804263		$450.00	65.98	$4,114.37
12	$500.00		1.268242		634.12		0.788493		$500.00	82.29	$4,871.34
13	$500.00		1.293607		646.80		0.773033		$500.00	97.43	$5,630.77
14	$500.00		1.319479		659.74		0.757875		$500.00	112.62	$6,392.45
15	$2,250.00		1.345868		3,028.20		0.743015		$2,250.00	127.85	$4,800.90
16	$1,500.00		1.372786		2,059.18		0.728446		$1,500.00	96.02	$4,146.54
17	$500.00		1.400241		700.12		0.714163		$500.00	82.93	$4,838.15
18	$2,150.00		1.428246		3,070.73		0.700159		$2,150.00	96.76	$3,172.98
19	$1,800.00		1.456811		2,622.26		0.686431		$1,800.00	63.46	$1,922.98
20	2,200.00		1.485947		3,269.08		0.672971		$2,200.00	38.46	$1.16
	$21,400.00								**$ 21,400.00**		
					Less Initial Deposit				$0.00		
									$ 21,400.00		
					Capital Recovery Factor		X		0.061157		
					Annual Annuity				**$1,308.80**		